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TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE CARRIER, CARGO, FULL-TRACKED, 7-TON, AMMUNITION, M992 (NSN 2350-01-110-4660) FIELD ARTILLERY AMMUNITION SUPPORT VEHICLE (FAASV)

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TECHNICAL MANUAL

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HEADQUARTERS
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TRANSPORTABILITY GUIDANCE

CARRIER, CARGO, FULL-TRACKED, 7-TON, AMMUNITION, M992 (NSN 2350–01–110–4660) FIELD ARTILLERY AMMUNITION SUPPORT VEHICLE (FAASV)

			Paragraph	*Page*
CHAPTER	1.	INTRODUCTION		
		Purpose and Scope	1–1	1–1
		Reporting of Recommendations and Comments	1–2	1–1
		Safety	1–3	1–1
		Definitions of Warnings, Cautions, and Notes	1–4	1–1
	2.	TRANSPORTABILITY DATA		
SECTION	I.	GENERAL		
		Scope	2–1	2–1
		Description	2–2	2–1
		Transportability Drawings	2–3	2–1
	II.	CHARACTERISTICS AND RELATED DATA		
		General Transportability Characteristics	2–4	2–4
		Unusual Characteristics	2–5	2–4
		Hazardous and Dangerous Characteristics	2–6	2–4
CHAPTER	3.	SAFETY		
		General	3–1	3–1
		Specific Safety Requirements	3–2	3–1
	4.	AIR TRANSPORTABILITY GUIDANCE		
		Scope	4–1	4–1
		Maximum Utilization of Aircraft	4–2	4–1
		Applicability	4–3	4–1
		Safety	4–4	4–1
		Transport by U.S. Air Force Aircraft	4–5	4–3
		Transport by U.S Army Aircraft	4–6	4–3
	5.	HIGHWAY TRANSPORTABILITY GUIDANCE		
SECTION	I.	GENERAL		
		Scope	5–1	5–1
		Safety	5–2	5–1
		General	5–3	5–1
	II.	TRANSPORT BY SEMITRAILER		
		General	5–4	5–1
		Transport of M992 FAASV on the M916/M870 and M123A1C/M172A1 Truck Tractor Combinations	5–5	5–1
CHAPTER	6.	MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE		
	I.	GENERAL		
		Scope	6–1	6–1
		Safety	6–2	6–1
		Water Shipment	6–3	6–1
	II.	LOADING AND SECURING		
		General Rules for Stowing Tracked Vehicles	6–4	6–1
		Barges and Lighters	6–5	6–6
		Barge-Type Ships (LASH-SEABEE)	6–6	6–6
CHAPTER	7.	RAIL TRANSPORTABILITY GUIDANCE		
SECTION	I.	GENERAL		
		Scope	7–1	7–1
		Maximum Utilization of Railcars	7–2	7–1
SECTION	II.	TRANSPORT ON CONUS RAILWAYS		
		General	7–3	7–1
		Preparation	7–4	7–1
		Loading M992 FAASV on General Purpose Flatcars	7–5	7–1
	III.	TRANSPORT ON FOREIGN RAILWAYS		
		General	7–6	7–6
		Transport on Foreign Service Flatcars	7–7	7–7
APPENDIX	A.	CONVERSION TABLES		A–1
	B.	REFERENCES		B–1

CHAPTER 1
INTRODUCTION

1–1. Purpose and Scope

This manual provides transportability guidance for logistical handling and movement of the M992 field artillery ammunition support vehicle (FAASV). It contains information considered appropriate for safe transport of the item. Also included are significant technical and physical characteristics as well as safety considerations required for worldwide movement by the various transportation modes. Where considered necessary, metric equivalents are given in parentheses following the dimensions or other measurements. This manual is intended for transportation officers and other personnel responsible for movement or for providing transportation services.

1–2. Reporting of Recommendations and Comments

Users of the manual are encouraged to submit comments and make recommended changes for its improvement. Comments and recommendations should be prepared on DA Form 2028 (Recommended Changes to DA Publications and Blank Forms) and forwarded to Commander, Military Traffic Management Command Transportation Engineering Agency, ATTN: MTT-TRC, PO Box 6276, Newport News, VA 23606-0276. Electrically transmitted messages should be addressed to CDR MTMCTEA FT EUSTIS VA//MTT-TRC//. A reply will be furnished by this command.

1–3. Safety

Appropriate precautionary measures required during movement of the item are contained in chapter 3.

1–4. Definitions of Warnings, Cautions, and Notes

Throughout this manual, warnings, cautions, and notes emphasize important or critical guidance. They are used for the following conditions:

a. Warning. Instructions that, if not followed, could result in injury to or death of personnel.

b. Caution. Instructions that, if not strictly observed, could result in damage to or destruction of equipment.

c. Note. An operating procedure or condition that must be emphasized.

CHAPTER 2
TRANSPORTABILITY DATA

SECTION I. GENERAL

2–1. Scope

This chapter provides a general description and indentification photographs of the M992 FAASV, as well as tabulated transportability characteristics that are necessary in movement of the item.

2–2. Description

The FAASV is a tracked vehicle that is used to carry ammunition for the self-propelled Howitzer (SPH). The FAASV (fig 2–1) is a deviation of the M109 chassis, which is also the chassis for the SPH. In the combat loaded configuration (with ammunition), the FAASV is capable of transporting 12,000 pounds or 6 tons of either 155mm (M992 version) or 8-inch (M1050 version) ammunition.

2–3. Transportability Drawings

Detailed side- and end-elevation transportability drawings of the M992 FAASV, with dimensions, tiedown and lift provisions, and load-rating capacities, are shown in figure 2–2 and 2–3, respectively.

Figure 2–1. The M992 field artillery ammunition support vehicle.

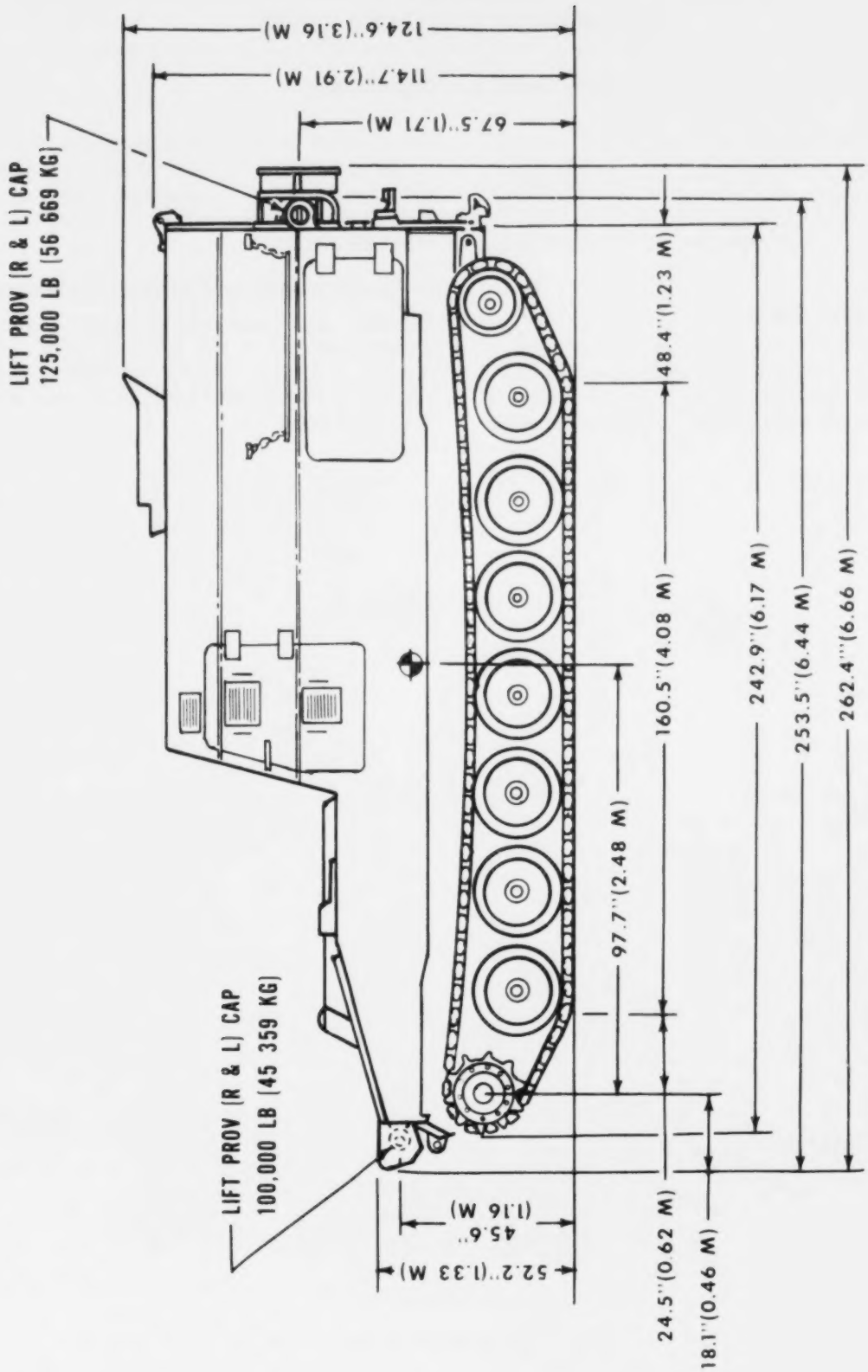


Figure 2-2. Transportability drawing, left-side view of the M992, field artillery ammunition support vehicle.

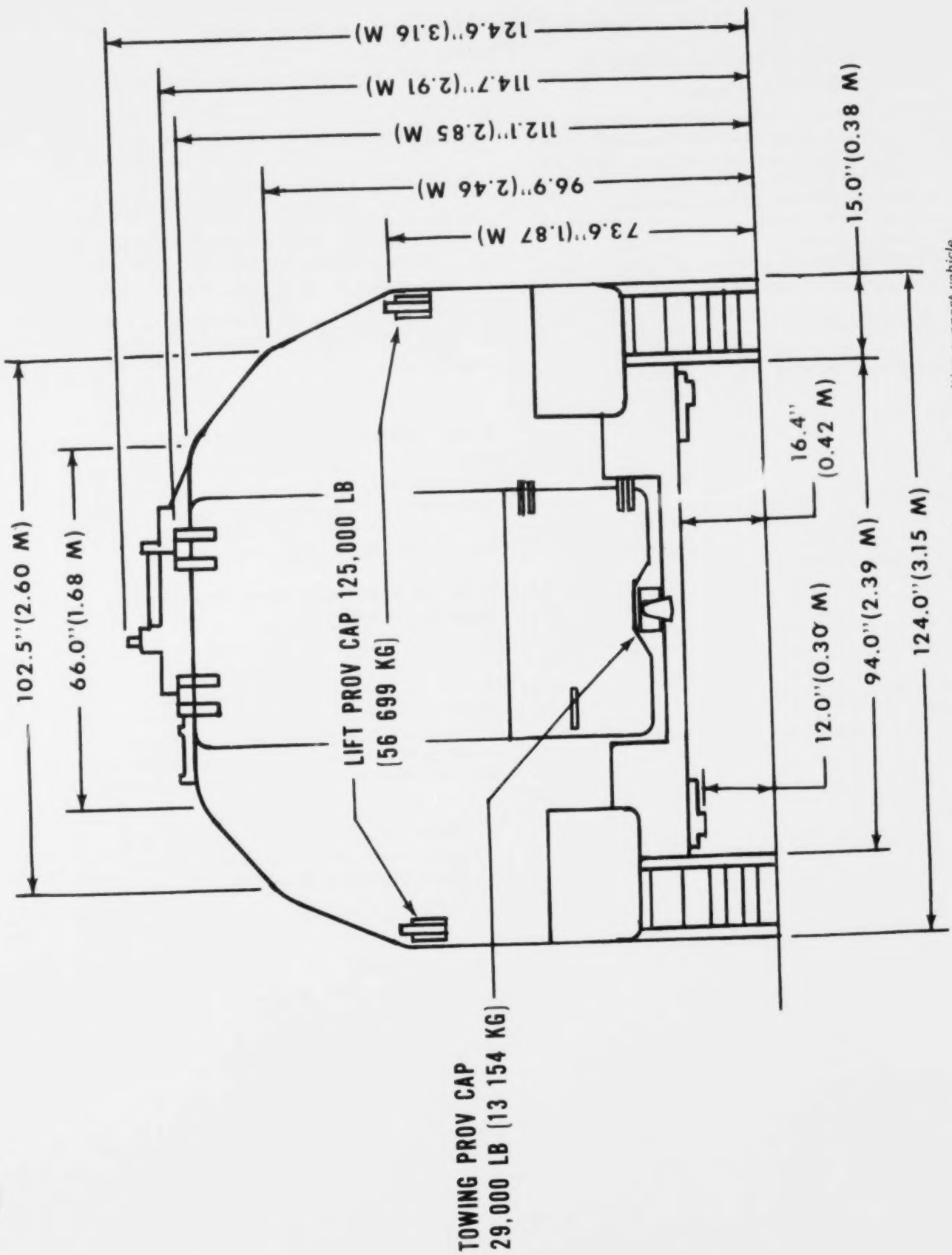


Figure 2–3. Transportability drawing, rear view of the M992 field artillery ammunition support vehicle.

SECTION II. CHARACTERISTICS AND RELATED DATA

2–4. General Transportability Characteristics

Data contained herein are applicable to the model number or national stock number (NSN) shown. Changes in model number or NSN may affect the loadability of the item as related to the guidance shown in this manual.

National stock number 2350-01-110-4660
Line item number C10908
Ground pressure:
  Unloaded (curb weight) ..... 52.07 psi ($3.7 kg/cm^2$)
  Load combat ..... 67.90 psi ($4.8 kg/cm^2$)
Ground contact area pad ..... 4,815 in^2 ($31.5 m^2$)
Track size ..... 15 in. (0.38 m)
Performance:
  Maximum speed, level road ..... 35 mph
  Maximum speed, 10 percent slope road ..... 12 mph
  Maximum grade ..... 60 percent
  Maximum range at 30 mph 220 mi
  Fuel tank capacity ..... 135 gal (510.9 L)
  Turning radius ..... 1 vehicle length
  Ground clearance ..... 16.38 in. (0.42 m)
Dimensions and shipping data:
  Length:
    Operational ..... 262.4 in. (6.16 m)
    Reduced ..... 253.5 in. (6.44 m)
  Width:
    Operational ..... 144.0 in. (3.66 m)
    Reduced ..... 124.0 in. (3.15 m)
  Height
    Operational ..... 126.0 in. (3.20 m)
    Reduced ..... 114.7 in. (2.91 m)
Center of gravity:
  Above ground ..... 33.8 in. (0.86 m)
  From center line of drive sprocket ..... 97.7 in. (2.48 m)
Weight:
  Shipping (less crew, ammunition & fuel) ..... 42,336 lb (19 203 kg)
  With combat load ..... 55,231 lb (25 052 kg)

2–5. Unusual Characteristics

This vehicle has no unusual characteristics that would require that special attention be given to temperature, atmospheric pressure, or humidity variations during its exposure to normal transportation environments.

2–6. Hazardous and Dangerous Characteristics

Unless the vehicle is shipped with ammunition under the provisions of Department of Transportation Special Permit No. 3498 (applicable to shipment in periods of actual national emergency), it will not present any special hazardous or dangerous characteristics during its exposure to normal transportation environments.

NOTE

Those regulations and/or transportation procedures normally associated with vehicles containing diesel fuel will apply.

CHAPTER 3
SAFETY

3–1. General

General safety considerations and precautions for movement are as follows:

a. Check each vehicle to ensure that all loose items are appropriately secured.

b. When blocking a vehicle, ensure that no personnel or obstacles are behind it.

WARNING

Fire extinguishers must be readily available during all loading and unloading operations.

WARNING

Proper ventilation must be provided during loading and unloading operations if vehicle engine is in use. Prolonged inhalation of carbon monoxide fumes will produce adverse affects that could prove fatal.

3–2. Specific Safety Requirements

Pertinent safety requirements by individual mode are given in the appropriate chapters of this manual.

CHAPTER 4
AIR TRANSPORTABILITY GUIDANCE

4–1. Scope

This chapter provides air transportability guidance for movement of the M992 FAASV. It covers significant technical and physical characteristics and safety considerations and prescribes the materials required to prepare load, and unload the M992 FAASV when transported in U.S. Air Force aircraft.

4–2. Maximum Utilization of Aircraft

The loads described in this chapter are not maximum loads. General guidance on total cargo loads and operating ranges is provided in TM 38-250/AFP 71-4. Additional cargo and/or personnel within allowable load limits and restrictions prescribed by pertinent safety regulations can be transported.

4–3. Applicability

a. U.S. Air Force Aircraft. The M992 FAASV is transportable only in the C-5 aircraft. Procedures in this manual and those prescribed by section VID, TO 1C-5A-9, are applicable.

b. Tiedown Devices. This vehicle is tied down in accordance with the respective figure and table. The vehicle tiedown pattern is shown in figure 4–1. Table 4–1 lists the tiedown devices required, the location of the tiedown points on the vehicle, the corresponding fittings to which the devices are secured, the number and capacity of devices, and the lumber shoring required for loading and/or securement. The minimum acceptable restraint factors (g loads) are identified in TO 1C-5A-9.

Table 4–1. Tiedown Data for M992 FAASV in U.S. Air Force C-5 Aircraft.

Designation	Tiedown Fitting Capacity in 1,000 lb	Type	Tiedown Device Capacity in 1,000 lb	Attach to Item
B1	25	MB-2	25	Right lifting eye.
C1	25	MB-2	25	Towing Pintle.
E1	25	MB-2	25	Towing Pintle.
F1	25	MB-2	25	Left lifting eye.
C2	25	MB-2	25	Right tiedown point.
E2	25	MB-2	25	Right, No. 6 road wheel arm.
C4	25	MB-2	25	Left tiedown point.
E4	25	MB-2	25	Left, No. 6 road wheel arm.
C5	25	MB-2	25	Right, No. 7 road wheel arm.
B6	25	MB-2	25	Right tiedown point.
C6	25	MB-2	25	Right tiedown point.
E6	25	MB-2	25	Left tiedown point.
F6	25	MB-2	25	Left tiedown point.
C7	25	MB-2	25	Right lifting eye.
E7	25	MB-2	25	Left lifting eye.

4–4. Safety

In addition to the safety precautions contained in chapter 3, the following should be noted:

a. The activity offering the vehicles for air transport must notify the aircraft commander or his/her designated representative when ammunition or explosives are to be transported within the vehicle and must ensure that all hazardous components have been prepared for shipment in accordance with TM 38-250.

b. The vehicle fuel tanks must not be more than three-fourths full.

c. The M992 FAASV must be restrained for air transport in accordance with the applicable procedures in section IV of TO 1C-5A-9. Procedures outlined in this manual are for general information.

WARNING

Fire extinguisher must be readily available during all loading and unloading operations.

WARNING

Proper ventilation must be provided when loading and unloading. Prolonged exposure to carbon monoxide fumes may be fatal.

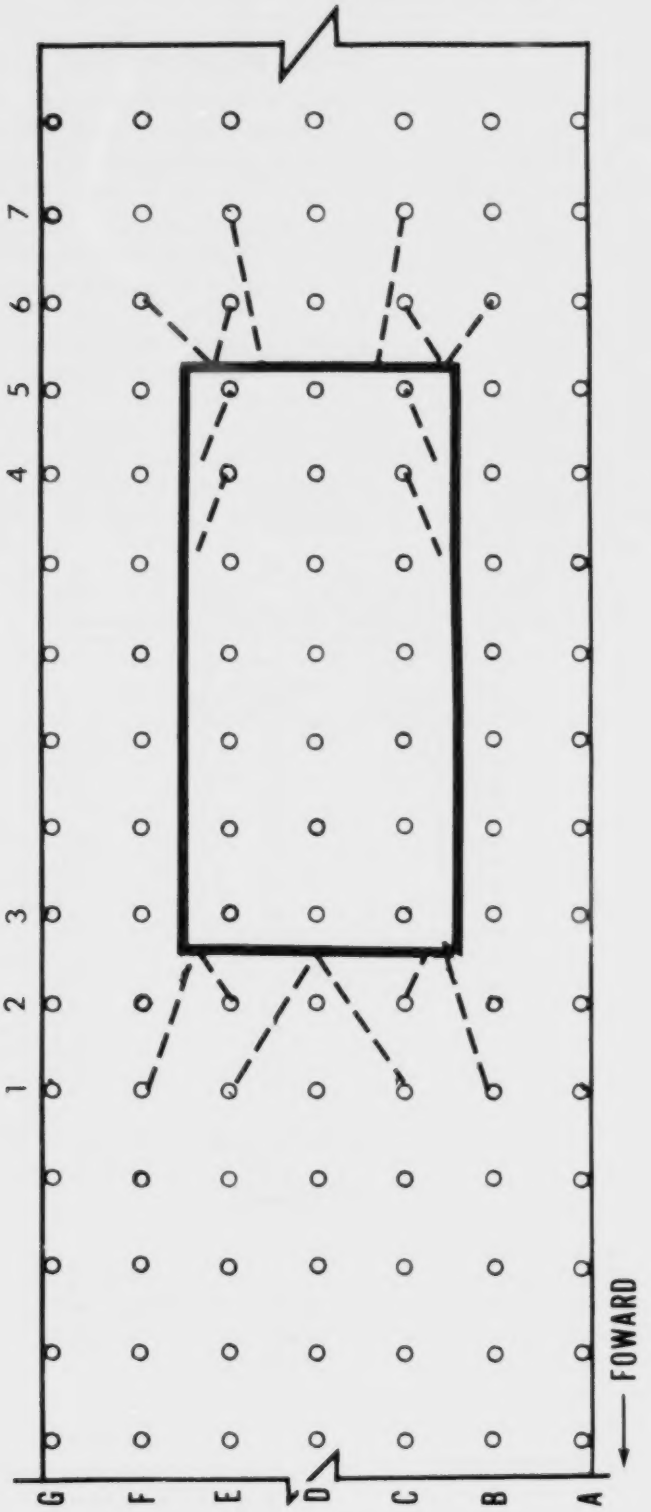


Figure 4–1. Typical tiedown diagram for the M992 FAASV in U.S. Air Force C–5 aircraft.

CAUTION

Do not allow vehicle speed to exceed 3 miles per hour inside the aircraft or on the loading ramps.

4–5. Transport by U.S. Air Force Aircraft

a. The M992 FAASV is transportable only in C-5 aircraft.

b. The aircraft commander or his/her representative is responsible for ensuring that the M992 FAASV is loaded/offloaded and properly secured in the aircraft in accordance with the criteria in section IV of TO 1C-5A-9.

c. When track pads are worn to the extent that deflection of the pads will cause the metal grousers of the track to contact the aircraft ramps or floor during loading or flight, rolling and parking shoring will be used.

d. When the M992 FAASV has been positioned aboard the aircraft, the transmission should be placed in neutral and parking brake set.

4–6. Transport by U.S. Army Aircraft

The M992 FAASV exceeds the size and weight limitations for internal or external transport by U.S. Army aircraft.

CHAPTER 5
HIGHWAY TRANSPORTABILITY GUIDANCE

SECTION I. GENERAL

5–1. Scope

This chapter provides highway transportability guidance for movement of the M992 FAASV. It covers significant technical and physical characteristics and safety considerations and prescribes the materials required to prepare and load the M992 FAASV on semitrailers.

5–2. Safety

In addition to safety precautions contained in chapter 3, movement within CONUS is subject to all safety laws, rules, and regulations applicable to commercial carriers. In oversea areas, movements are governed by the theater regulation.

CAUTION

Do not allow the M992 FAASV to exceed 3 miles per hour during loading and unloading operations.

5–3. General

The M992 FAASV is considered self-deliverable only under appropriate tactical situations. Although the vehicle tracks are equipped with rubber pads, movement over paved public highways will not be made without specific approval as outlined in AR 55-162. The weight of the FAASV is considered excessive for some bridges and will require special routing.

SECTION II. TRANSPORT BY SEMITRAILER

5–4. General

The M992 FAASV can be transported by highway mode. Major restrictions will be encountered when the M992 FAASV is moved by truck tractor/semitrailer combination. The M992 FAASV can be transported by both the M916/M870 and the M123A1C/M172A1 truck tractor/semitrailer combinations. When the M916/M870 combination is used, the commander's cupola can be placed on the M870 semitrailer. When the M123A1C/M172A1 combination is used, a cargo truck will be needed to haul the commander's cupola.

5–5. Transport of M992 FAASV on the M916/M870 and M123A1C/M172A1 Truck Tractor/Semitrailer Combinations.

a. M916/M870 Combination. Restrictions of the FAASV for transport on the M916/M870 truck tractor/semitrailer combination are major. Both legal and permitted limits are exceeded for CONUS transport and are mostly attributed to the gross vehicle weight and tandem axle load. Most of these restrictions are within the permit limits; however, some permit limits are exceeded for tandem axle load and gross vehicle weight.

b. M123A1C/M172A1 Combination. The M123A1C/M172A1 truck tractor/semitrailer combination is another alternative for transporting the reduced FAASV. When this combination is used, the commander's cupola must be moved by a cargo truck because it will not fit on the semitrailer. Restrictions for this combination are attributed to the width, tandem axle load, and gross vehicle weight. Legal limits are exceeded for width, height, single axle load, tandem axle load, and gross vehicle weight. Most of these restrictions can be resolved with a permit.

c. Materials. Adequate tiedown chains and binders for securing the M992 FAASV are carried aboard the trailers and are considered as basic issue items. Other required tiedown material is shown in table 5–1.

d. Loading.

WARNING

At no time during loading operations should personnel be on the trailer bed.

WARNING

Loading should not be conducted on the side of a slope that exceeds 10 percent, or with a tractor-to-trailer offset angle greater than 5°. Loading should not be conducted on a severe downgrade, because the payload may roll forward on the trailer.

(1) Position curbing assemblies on the trailer bed so that they will be against the inside edge of both tracks when the M992 FAASV is aboard the trailer.

(2) Drive or winch the FAASV to the farthest forward position, against the wooden bumper.

e. Tiedowns. Tiedown diagrams compatible with standard loading practices that will offer adequate restraint against forces encountered during movement at normal speeds and operating conditions are provided in figures 5–1 and 5–2.

f. Data concerning the application of materials required to restrain the vehicle are provided in table 5–2.

Table 5–1. Bill of Materials for Blocking and Tiedown of the M992 FAASV on the M870 and M172A1 Semitrailers.

Item	Description	Approximate quantity
Lumber	Douglas-fir, or comparable, straight-grain, free from material defects; Fed Spec MM-L-751: 2- × 4-inch	6 linear feet
	4- × 4-inch	12 linear feet
Nails	Common, steel; flathead; bright or cement-coated; table X1-b, Fed Spec FF-N-105: 30d	8
Wire rope	6 × 19, IWRC, improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-410: ⅝-inch	62 feet
Clamps	Wire-rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; MIL-STD 16842: ⅝-inch	16
Chain*	Utility; ¾-inch-diameter chain link, 12-foot-long, NSN 4010-00-449-6573	4
Load binders*	Ratchet-type with one grabhook and one pear-shaped link, 12-ton-capacity, NSN 3990-00-401-1503	4
Thimbles	Standard, open-type: ⅝-inch	4
Shackles	Anchor, 1⅜-inch diameter pin, 2-inch opening, NSN 4030-00-162-7545, or equal.	4

*Chains and load binders may be substituted for ⅝-inch wire rope and clamps.

Table 5–2. Application of Materials for Tiedown of the M992 FAASV on the M747 Semitrailer.

Item	No. required	Application
A	4	Road wheel chocking (fig 5–3), two pieces of 4- × 4-inch × length-to-fit lumber. Place one piece on track between inside road wheels and the other piece on track between outside road wheels. Secure both pieces in place with item B.
B	2	Tie cleat (fig 5–7), 2- × 4-inch × length-to-fit lumber. Place across top of item A and secure to outside of item A with two 30d nails.
C	4	Wire rope, ⅝-inch. Attach two complete loops from each M992 lifting eye to outside tiedown rings on semitrailer. Secure the ends of each loop with four clamps (item D).
D	24	Clamps, ⅝-inch. Secure the overlapping ends of each wire-rope loop with four clamps. Secure the thimbles with one clamp.
E	4	Shackles. Secure one shackle to each lifting eye (two at front and two at rear of vehicle).
F* & G*	4	Chains and load binders. Not required if items C and D are used.
	2	Chains and load binders. Secure chain to each front lifting eye with shackles. Guide each chain through adjacent gooseneck upper rollers. Install load binder over cleat at front of gooseneck. Ratchet load binder to full extension and attach grabhook to chain. Tighten chains with load binders.
	2	Chains and load binders. Secure one chain to shackle in each rear lifting eye and attach to grabhook of load binder attached to the outside tiedown eyes. Tighten chains with load binders.

*Items F and G may be substituted for items C and D.

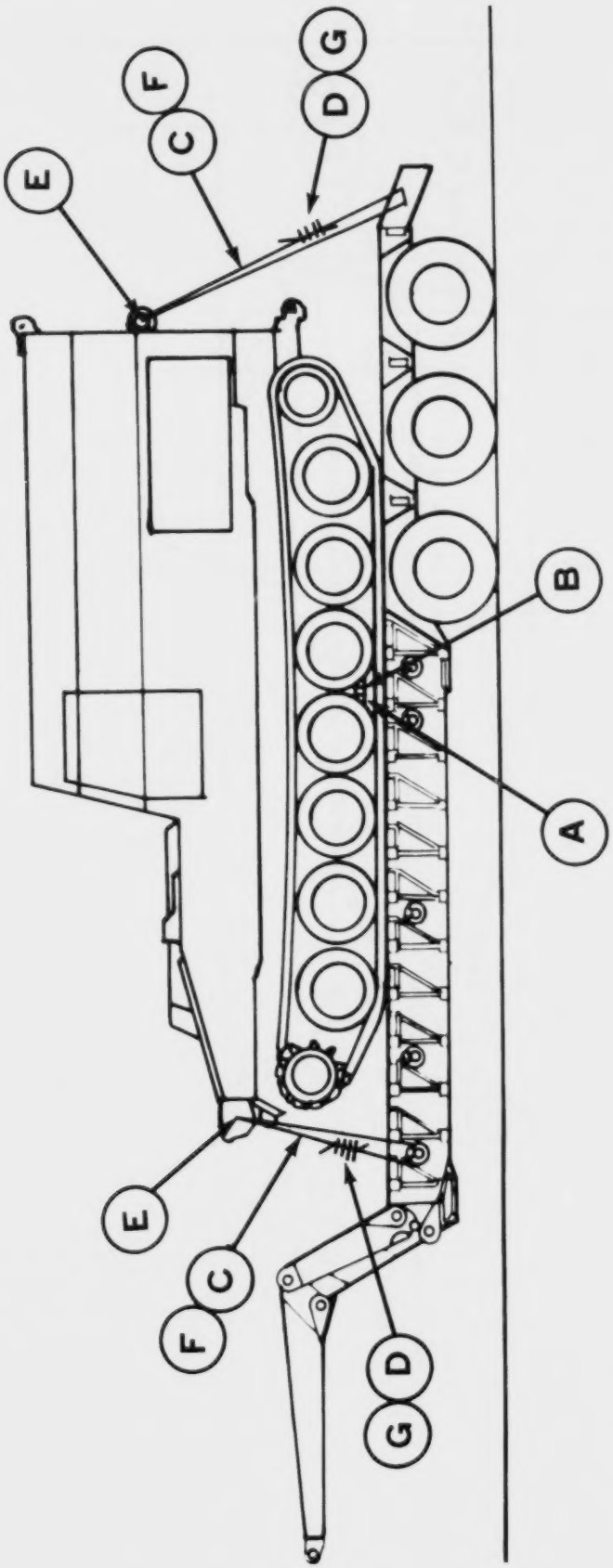


Figure 5–1. Tiedown diagram for the M992 FAASV loaded on the M870 semitrailer.

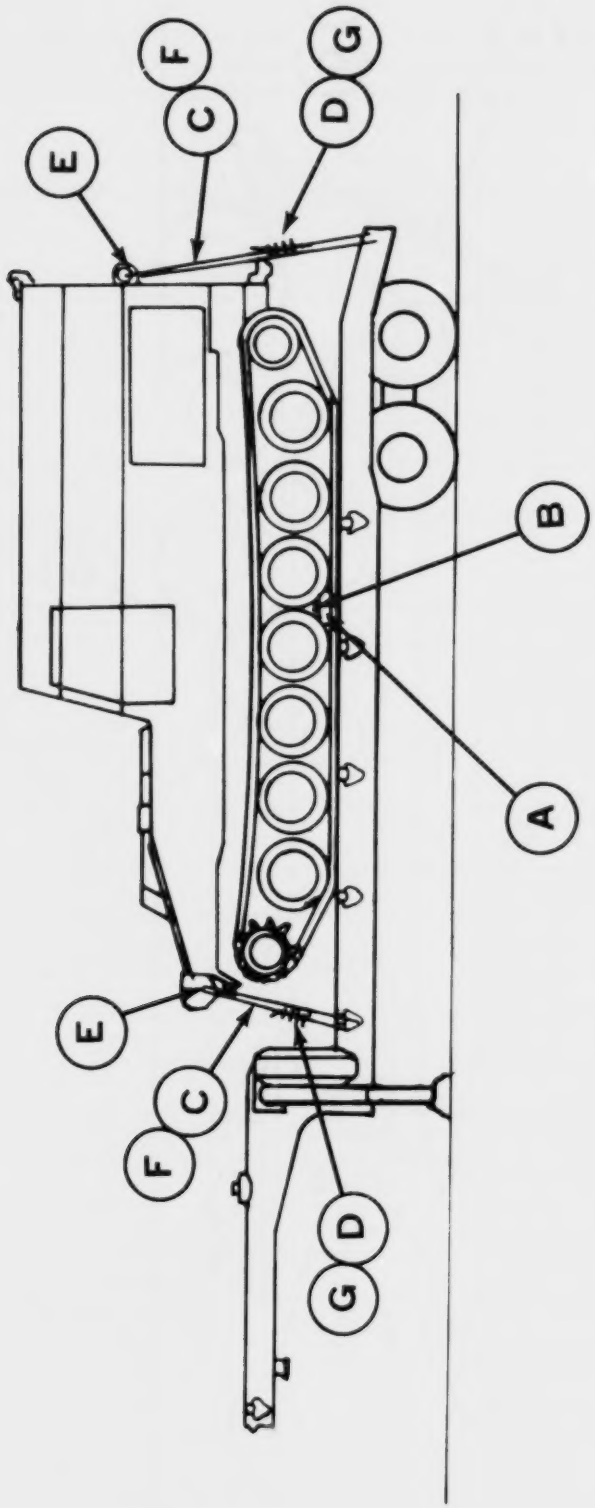


Figure 5-2. Tiedown diagram for the M992 FAASV loaded on the M172A1 semitrailer.

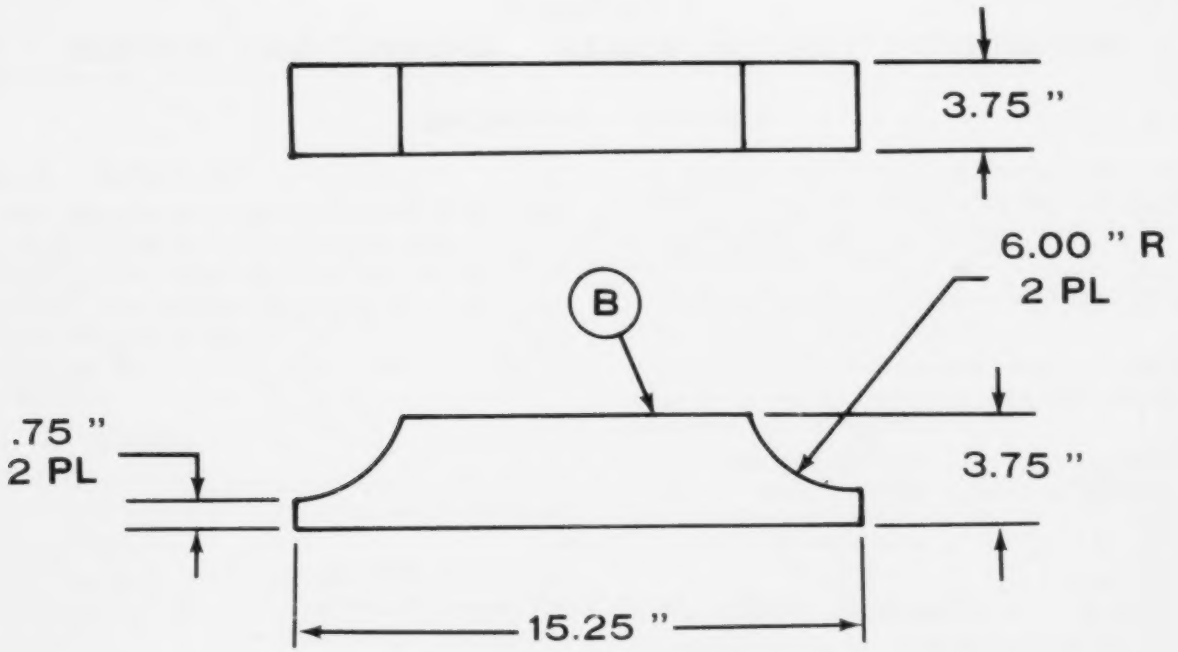


Figure 5–3. Road wheel chocking diagram.

CHAPTER 6
MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

SECTION I. GENERAL

6–1. Scope

This chapter provides marine and terminal transportability guidance for movement of the M992 FAASV. It covers significant technical and physical characteristics and safety considerations and prescribes the materials required to prepare, lift, tie down, and discharge the M992 FAASV.

6–2. Safety

In addition to the safety precautions contained in chapter 3, the following areas should be noted as applicable:

a. The activity offering the M992 FAASV for transport will notify the carrier if ammunition or explosives are to be transported with the vehicle. Compliance with paragraph 2–7, AR 55–228, is mandatory.

b. Ammunition and vehicle will be handled and stowed in accordance with provisions contained in Water Carrier Tariff No. 31 or reissues thereof.

c. Fire extinguishers must be available during all loading and unloading operations.

d. Vessel equipment and gear should be inspected before being used.

e. Slings, chains, cables, and other items used in the loading, discharge, and tiedown operations shall be inspected for condition and adequate capacity.

f. Personnel should be cautioned not to walk under vehicle being lifted.

g. Lifting eyes and shackles one each vehicle shall be inspected to ensure that they are complete and not damaged.

h. All lifts should have at least two long lines attached to control the sway of the M992 FAASV while suspended.

6–3. Water Shipment

The vehicles can be transported by a great variety of inland-waterway cargo carriers and lighters and by all seagoing cargo vessels.

NOTE

The methods described in this chapter for lifting and securing the M992 FAASV are suggested procedures. Other methods of handling and stowing may be used provided they will ensure safe delivery without damage.

SECTION II. LOADING AND SECURING

6–4. General Rules for Stowing Tracked Vehicles

a. Storage. Whenever possible, the M992 FAASV should receive the protection of below-deck stowage. In general, good stowage of the FAASVs means that they are placed as close together as practical, with minimum space between outer vehicles and sweatboards (about 4 to 6 inches); breakable parts are protected and spare parts are located usually within or near the vehicles; brakes are set with brake lever wire-tied; transmission is positioned in neutral with control lever wire-tied; battery terminal is disconnected and taped; and fuel tanks are drained. The vehicles are secured with blocks braced in the front, rear, and on both sides of the vehicle and with bulkhead, stanchions or padeyes lashed with wire rope or chains.

NOTE

When FAASVs are loaded on vessels that are adequately ventilated by power blowers, such as the roll-on/roll-off vessels, fuel need not be drained from fuel tanks.

b. Lifting. The correct lifting points on the FAASV are the lifting eyes—one located on the end of the upper front corner of the hull and one on each upper rear corner of the hull, for a total of four.

c. Loading. The FAASVs will be loaded on vessels in their minimum configuration. They may be driven or lifted by crane of adequate capacity onto landing craft, beach discharge lighters, heavy amphibious lighters and landing ships. It can also be driven onto the decks of barges from a pier when tidal conditions are suitable and ramps are available. They can be

loaded onto seagoing vessels by shoreside or floating cranes of adequate capacity or by heavy-lift ships gear. The FAASV can be driven or towed onto roll-on/roll-off vessels. However, the M992 FAASV cannot be transported on the LARC V and LARC XV. Typical lifting diagrams for the M992 FAASV are shown in figures 6–1 and 6–2. Typical blocking and tiedown details are shown in figure 6–3. Materials and their applications are listed in tables 6–1 and 6–2.

Table 6–1. Bill of Materials for Blocking and Tiedown of the M992 FAASV in the Hold of a General-Cargo Vessel (Fig 6–3).

Item	Description	Approximate quantity
Lumber	Douglas-fir, or comparable, straight-grain, free from material defects; Fed Spec MM-L-751:	
	4- × 6-inch	4 linear feet
	2- × 12-inch	56 linear feet
	6- × 8-inch	95 linear feet
Nails	Common, steel; flathead; bright or cement-coated; table X1-b, Fed Spec FF-N-105: 40d	68
Wire rope	6 × 19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-410:	
	⅝-inch	62 feet
Clamps	Wire-rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; MIL-STD-16842:	
	⅝-inch	16 ea
Shackles	Anchor, 1-⅜-inch-diameter pin, 2-inch opening NSN 4030-00-162-7545, or equal	4
Padeyes	Built into vessel deck	4
Turnbuckles	¾- × 12-inch	4

Table 6–2. Application of Materials for Blocking and Tiedown of the M992 FAASV in the Hold of a General Cargo Vessel (Fig 6–3).

Item	No. Required	Application
A	4	Lumber, 2- × 12- × 168-inch. Preposition lumber on vessel hold floor under vehicle treads. Two pieces are required under each tread but are not used if tracks have rubber pads.
B	2	Side blocking. Each consists of 6- × 8- × 310-inch lumber. Place one piece on each side of the M992 against outside edge of tracks.
C	2	End blocking. Each consists of 6- × 10- × 140-inch lumber. Place on top of item B and against tracks front and rear. Toenail to item B with four 40d nails at each end.
D	4	Backup cleats, 4- × 6- × 12-inch lumber. Place on top of item B and against item C. Toenail to item B with four 40d nails.
E	4	Shackles. Secure one shackle to each lifting eye (two at front and two at rear of M992).
F	2	Wire-rope, ⅝-inch, in a complete loop. Secure with clamps (item G). Attach to front and rear shackles and to item K.
G	16	Clamps, ⅝-inch. Use four clamps to secure each item F and K.
H	4	Padeyes are welded to deck.
J	As required	Bracing. Brace as required against adjacent vehicle, cargo, or side of vessel bulkhead. Secure each end of piece to adjacent blocking or bracing by toenailing with four 40d nails.
K	2	Turnbuckle, ¾- × 12-inch. Install between item H and F.

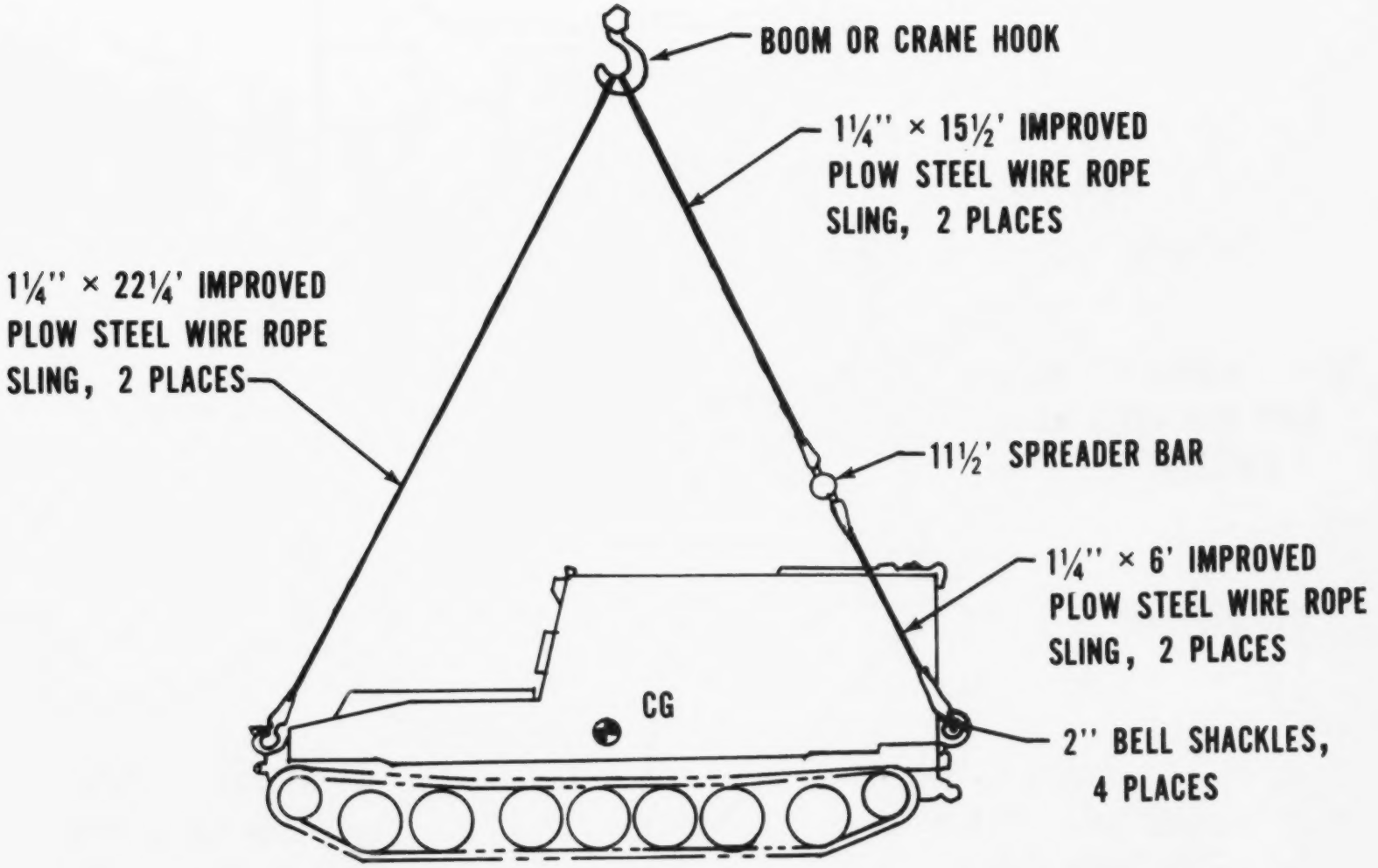

BOOM OR CRANE HOOK
1¼" × 15½' IMPROVED PLOW STEEL WIRE ROPE SLING, 2 PLACES
1¼" × 22¼' IMPROVED PLOW STEEL WIRE ROPE SLING, 2 PLACES
11½' SPREADER BAR
1¼" × 6' IMPROVED PLOW STEEL WIRE ROPE SLING, 2 PLACES
CG
2" BELL SHACKLES, 4 PLACES

Figure 6–1. Lifting diagram for the M992 FAASV with wire rope and spreader bar, side view.

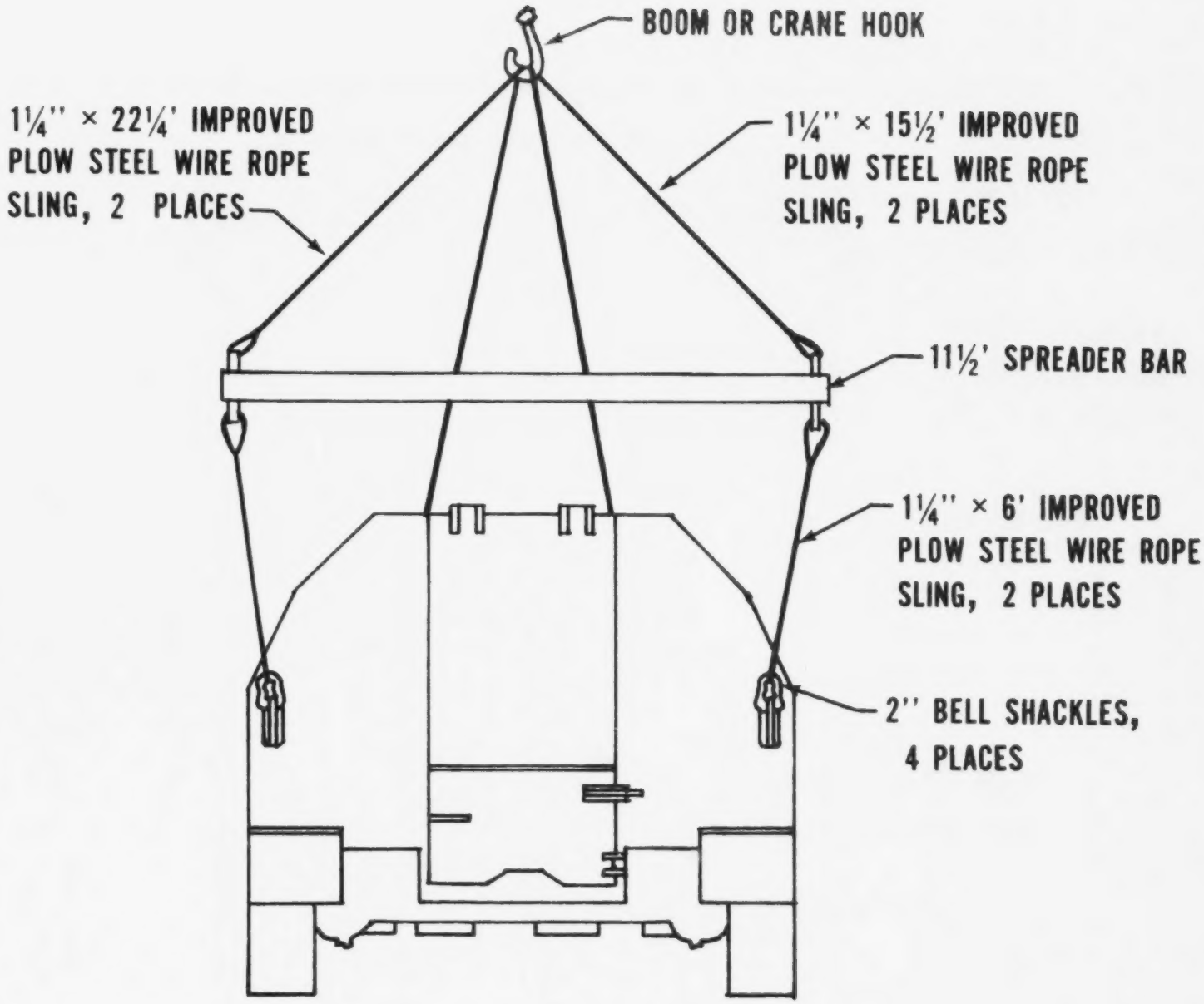

BOOM OR CRANE HOOK
1¼'' × 22¼' IMPROVED PLOW STEEL WIRE ROPE SLING, 2 PLACES
1¼'' × 15½' IMPROVED PLOW STEEL WIRE ROPE SLING, 2 PLACES
11½' SPREADER BAR
1¼'' × 6' IMPROVED PLOW STEEL WIRE ROPE SLING, 2 PLACES
2'' BELL SHACKLES, 4 PLACES

Figure 6–2. Lifting diagram for the M992 FAASV, rear view.

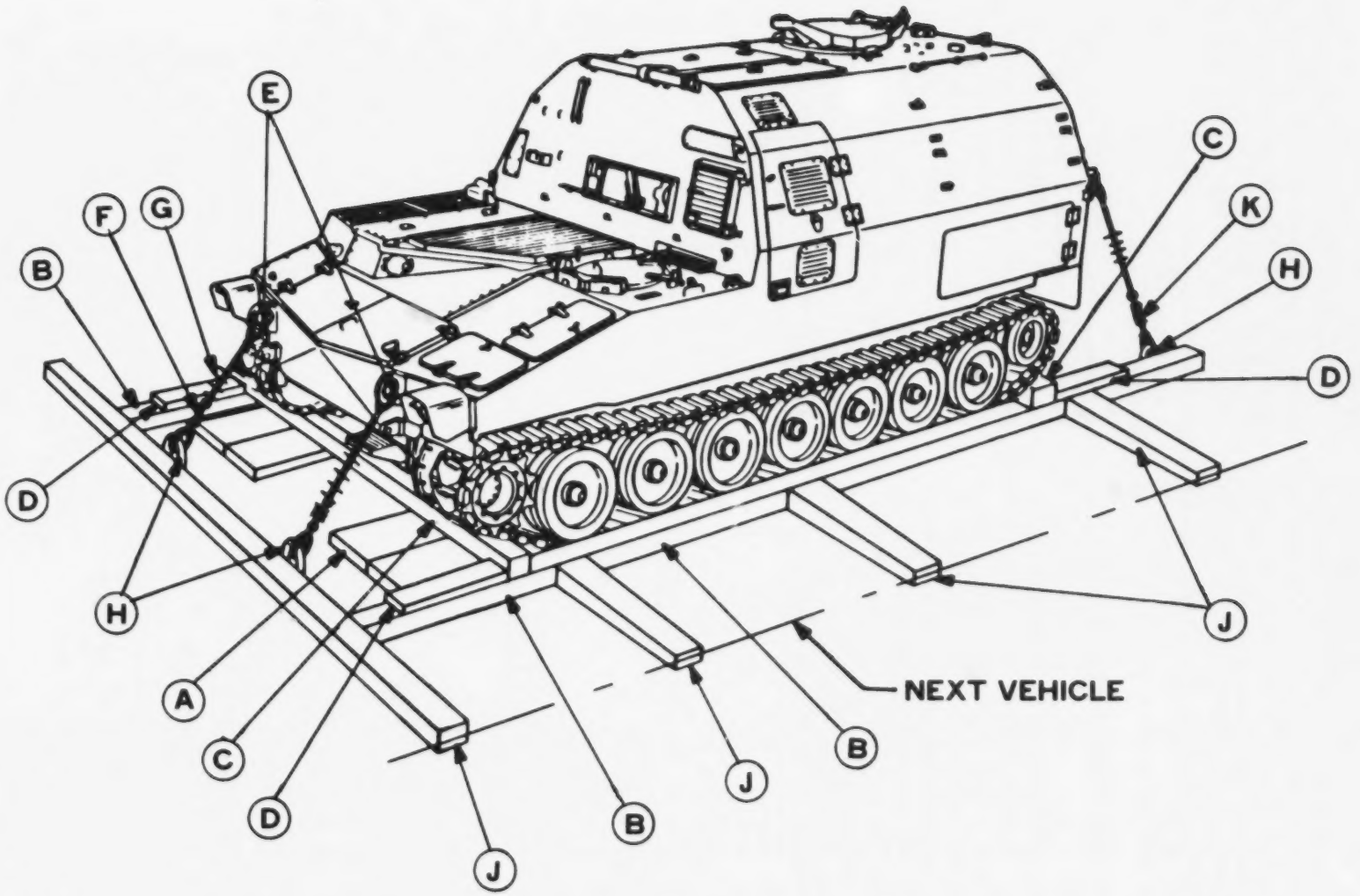


Figure 6–3. Typical blocking and tiedown of the M992 FAASV in general cargo vessel.

6–5. Barges and Lighters

When the FAASVs are to be transported by lighters or barges to or from vessels secured to a pier or at a sheltered anchorage, blocking and bracing will be required. When the FAASVs are moved extended distances or through rough waters, tiedowns must also be used. The FAASV can be transported under the pontoons of the C–8 and C–9 lighter provided the cupola is removed so that the height is reduced.

6–6. Barge-Type Ships (LASH-SEABEE)

a. General. To transport the M992 FAASV by barge-type ships, securement with blocking and tiedowns is required as illustrated in figure 6–4. The FAASV can be transported in the operational configuration under the pontoon of SEABEES and can also be transported in the forward and aft bulkheads if the commander's cupola is removed. Barge stability is noticeably affected by the loading of heavy-lift items, and tracked vehicles should be loaded symmetrically in sequence about the center line of the barge or lighter.

b. Dunnage. Dunnage is not generally used beneath the treads of most tracked vehicles equipped with rubber tread pads, and the decks are sufficient to make it unnecesary. However, deck surfaces should be dry and free of grease or debris.

c. Blocking. M992 FAASV may be adequately blocked and braced with 6- by 8-inch timbers. Blocking should be installed as a separator between the M992 track and the barge bulkhead. Blocking is normally installed in front of and rear of the tracks, and the bracing part is forced-fitted to the bulkhead. Loading, blocking, and bracing proceed from the outer areas of the barge toward the center, which is loaded last. Separator timbers are installed against the bulkhead or track, and the next M992 to be loaded is placed firmly against the timber. Any void area remaining in the center of the barge after the last vehicle has been loaded is filled (fig 6–5) with cut and force-fitted blocking.

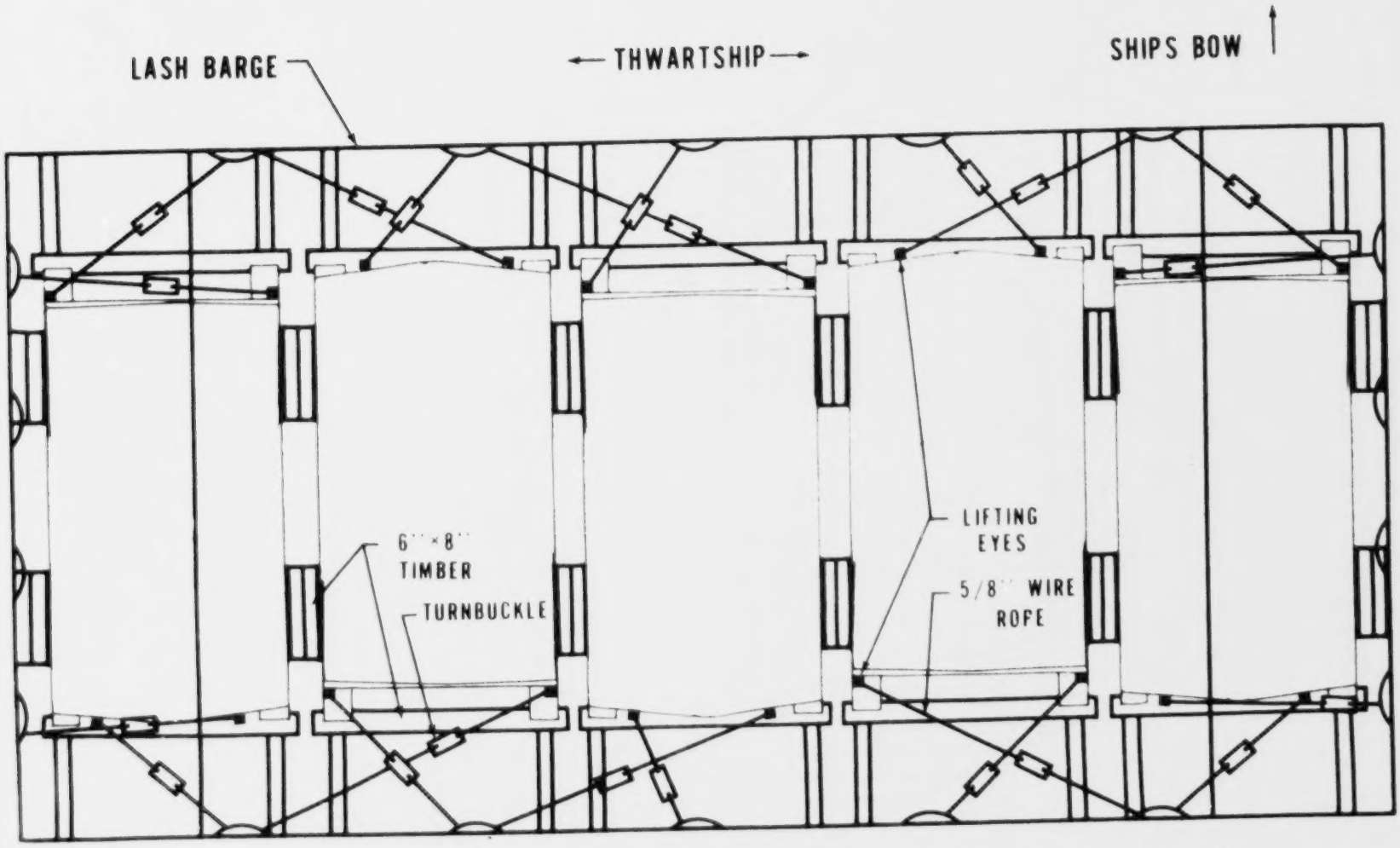


Figure 6–4. Typical loading of four M992 FAASVs on a LASH lighter, with wire rope, cable clips and turnbuckles and with blocking between FAASVs and between FAASVs and hull.

Figure 6–5. Filling center void or FAASVs to hull void area.

CHAPTER 7
RAIL TRANSPORTABILITY GUIDANCE

SECTION I. GENERAL

7–1. Scope

This chapter provides rail transportability guidance for movement of the M992 FAASV. It covers technical and physical characteristics and safety considerations and prescribes the materials and guidance required to prepare, load, and tie down the M992 FAASV on open top flatcars.

7–2. Maximum Utilization of Railcars

Additional cargo, as approved by the activity offering the items for transport, may be transported with the vehicles.

SECTION II. TRANSPORT ON CONUS RAILWAYS

7–3. General

The transportability guidance contained in this section is applicable when the vehicle is transported on CONUS railways. Consideration is given to single and multiple movements for the types of flatcars normally used in the movement of this vehicle.

7–4. Preparation

For the FAASV to be shipped on a standard 50-inch high flatcar, the following items should be removed:

a. Latch assembly, from left, right, and personnel doors (store inside vehicle).

b. Duffle bag shelf, left and right side (store inside vehicle).

c. Stowage basket on rear of M992 (store inside vehicle).

d. Stowage box on rear of M992 (store inside vehicle).

e. Stowage box assembly on rear of M992 (store inside vehicle).

f. Commanders cupola (blocked and anchored to the railcar in a manner that will prevent damage or movement in transit).

7–5. Loading M992 FAASV on General Purpose Flatcars

a. The vehicle may be placed in the tiedown position on the flatcar by a crane, or it may be driven or towed if a suitable ramp or bridge is available.

b. After the vehicle is loaded and placed in the tiedown position, handbrakes on the vehicle should not be set. The gearshift lever for the transmission must be placed in the neutral position.

c. Loads shown in figures 7–1 through 7–3 are based on a flatcar that is 10 feet 4 inches wide, minimum.

CAUTION

Do not allow vehicle to exceed 3 miles per hour during loading or unloading.

d. Bill of materials for blocking and tiedown of the M992 FAASV on the flatcar is shown in table 7–1. Blocking and tiedown are compatible with standard loading practices and provide for adequate restraint against the forces encountered during movements at normal speeds. Blocking details are described in figure 7–4. Application of materials for loading and securing the vehicle on the flatcar is shown in table 7–2.

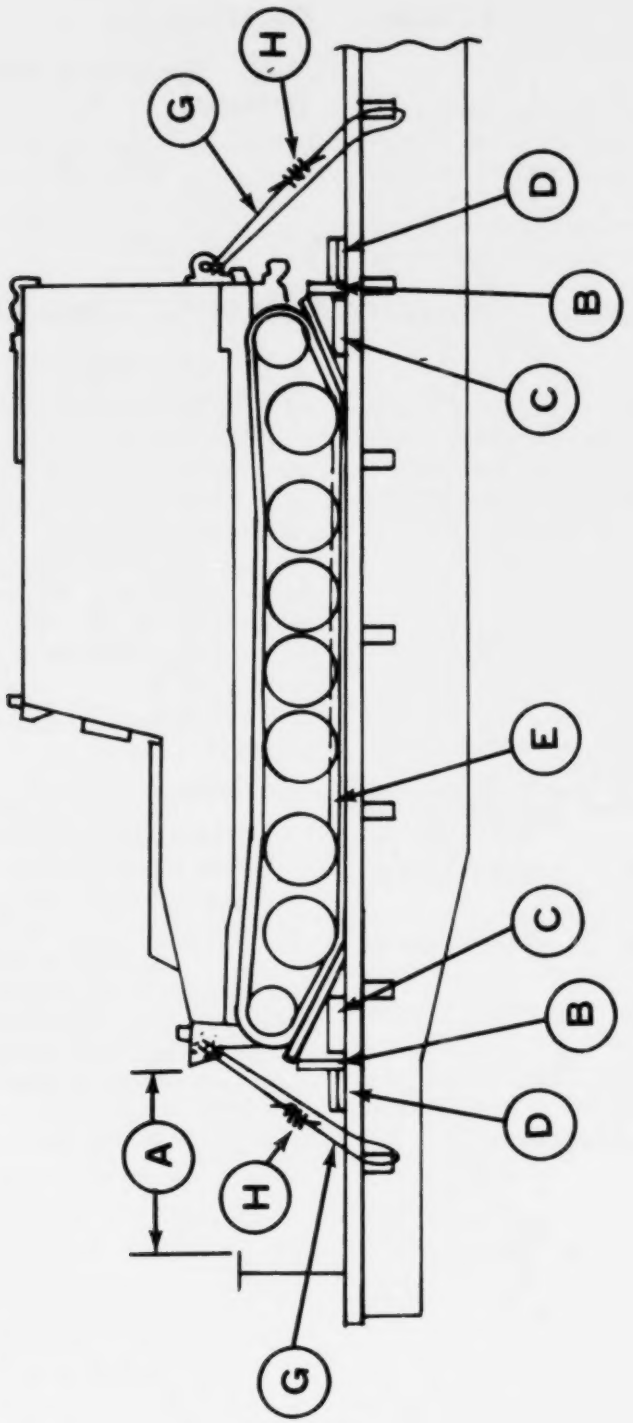


Figure 7–1. Blocking and tiedown for the M992 FAASV on general purpose flatcar (side view).

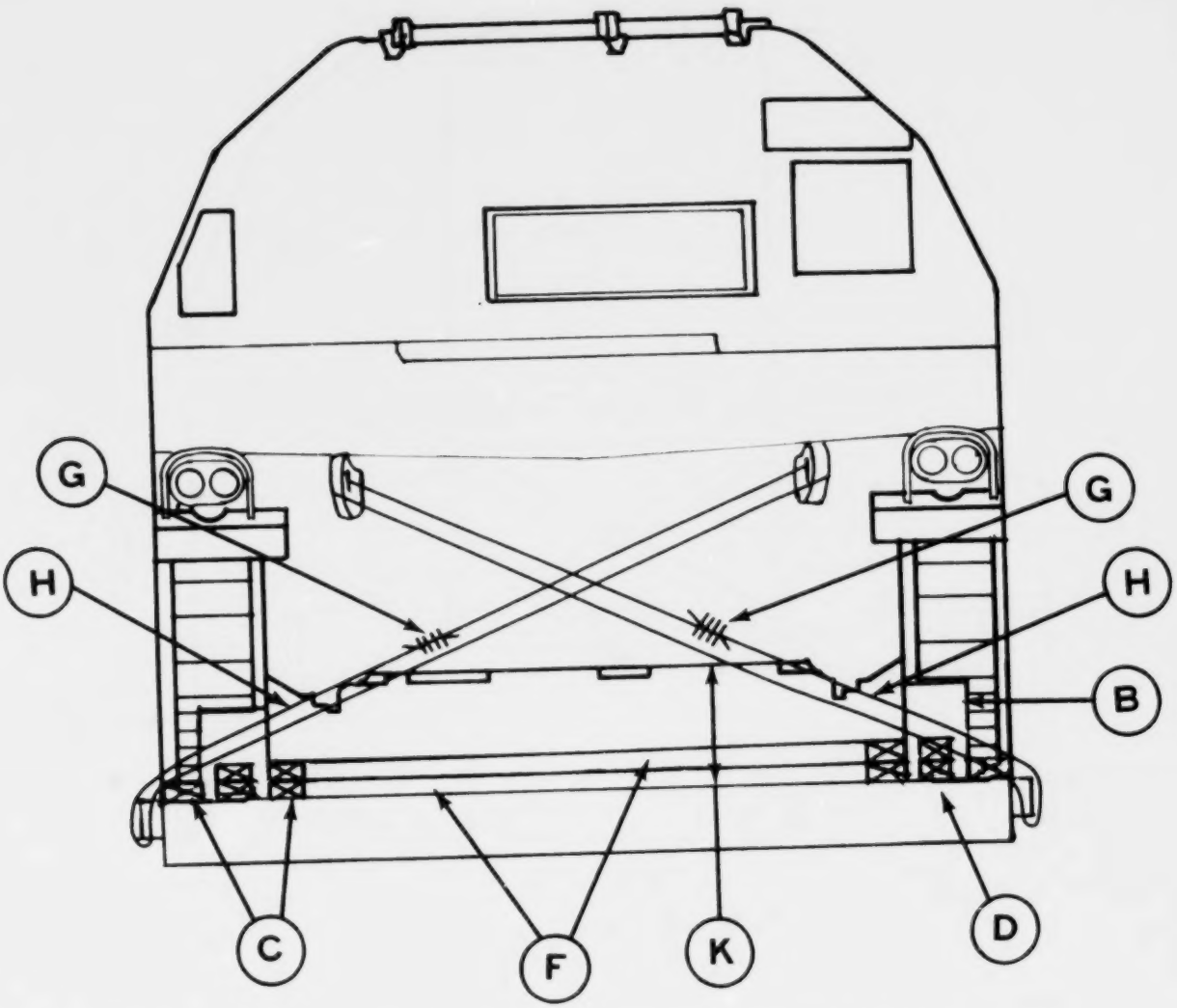


Figure 7–2. Blocking and tiedown for the M992 FAASV on general purpose flatcar (front view).

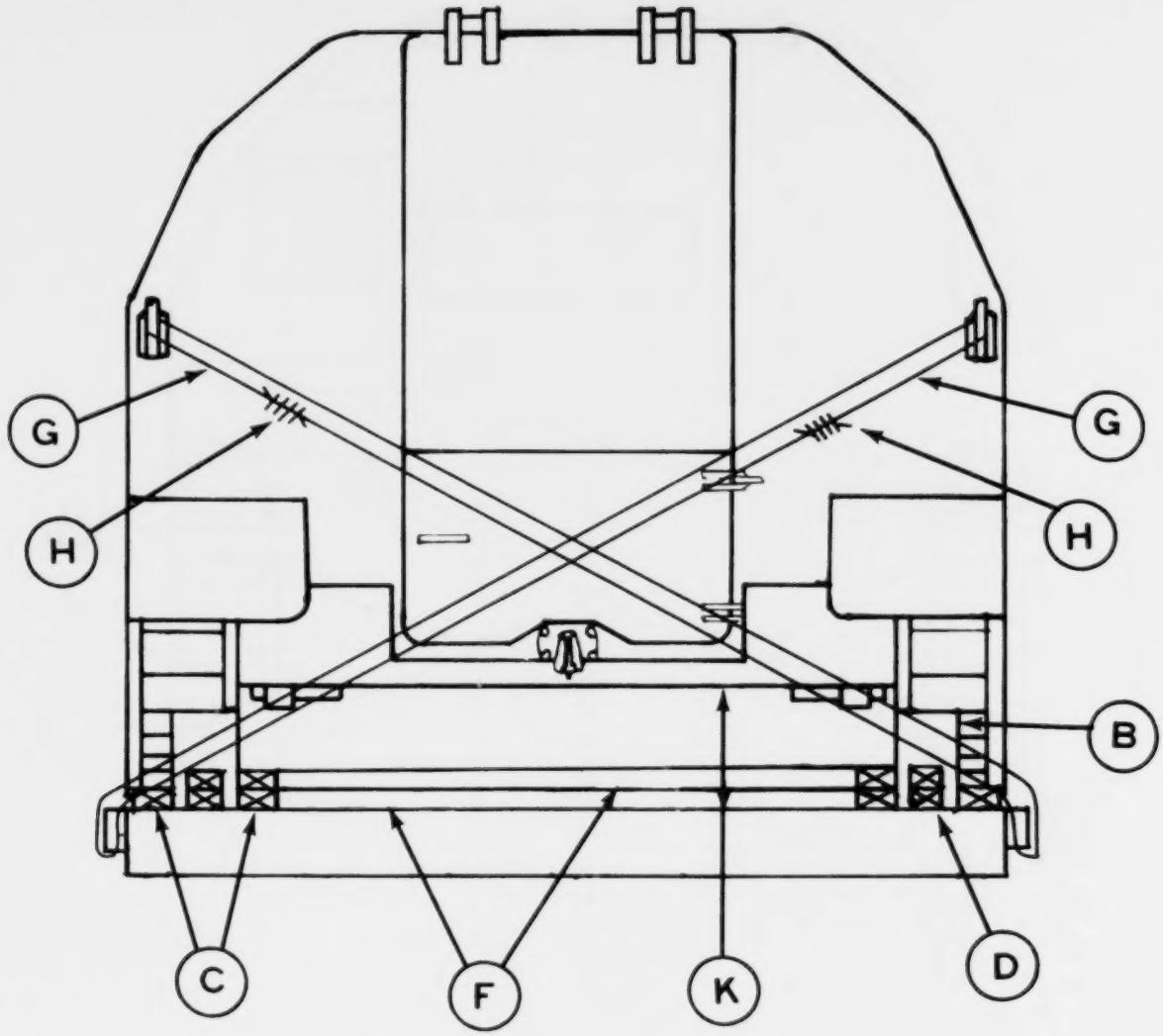
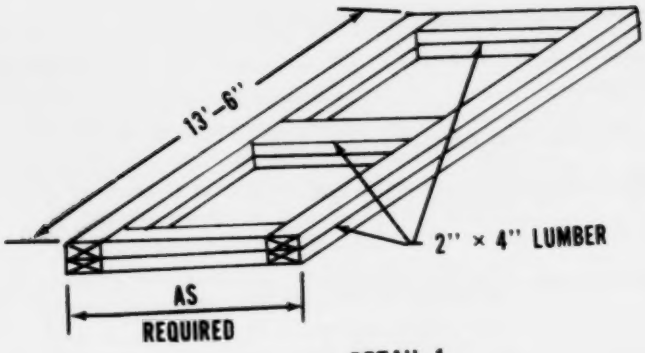
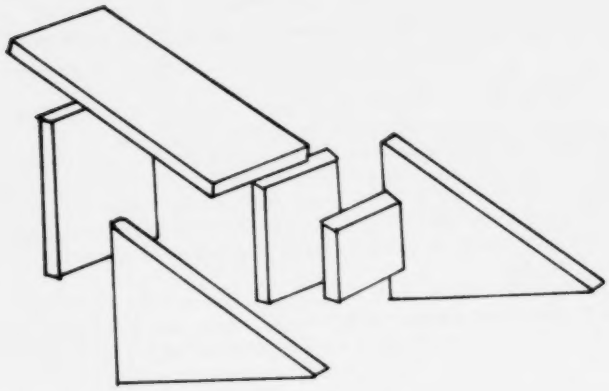


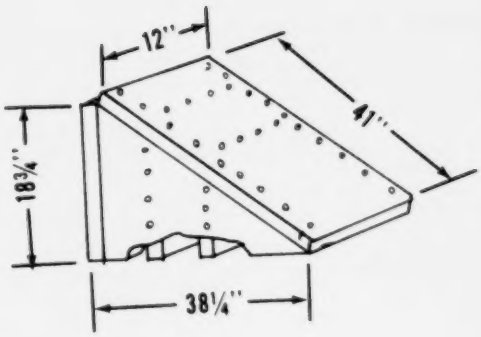
Figure 7–3. Blocking and tiedown for the M992 FAASV on general purpose flatcar (rear view).



DETAIL 1



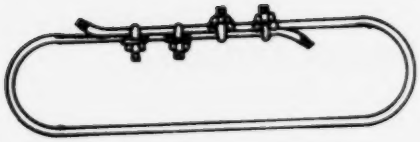
EXPLODED VIEW



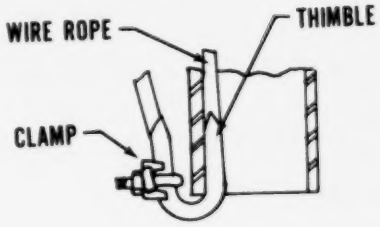
ASSEMBLED VIEW

DETAIL 2

FABRICATE BLOCKS FROM 2-×12-IN LUMBER. USE 20d NAILS



DETAIL 3



DETAIL 4

Figure 7–4. Blocking and tiedown detail diagram.

Table 7–1. Bill of Materials for Blocking and Tiedown of the M992 FAASV on General-Purpose Flatcar (Figs 7–1 through 7–3)

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable, straight-grain, free from material defects; Fed Spec MM-L-751: 2- x 4-inch.	70 linear feet
Nails	Common, steel; flathead; bright or cement-coated; table X1-b, Fed Spec FF-N-105: 30d	124
Wire rope*	6 x 19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-410: 5/8-inch	62 feet
Clamps*	Wire-rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; MIL-STD-16842L 5/8-inch	16
Thimbles*	Standard, open-type: 5/8 inch	4

*Suitable capacity chains and load binders may be substituted for 5/8-inch wire ropes and clamps.

Table 7–2. Application of Materials for Loading and Securing M992 on General-Purpose Flatcar (Figs 7–1 through 7–3).

Item	No. required	Application
A	—	Brake-wheel clearance. Minimum clearance required is 6 inches above, in back of, and on both sides of, and 4 inches underneath the wheel.
B	4	Blocks (detail 2, fig 7–4). Locate one against the front and rear of each track.
C	8	Side cleats. Each consists of one piece of 2- × 4- × 20-inch lumber. Place one piece on each side of each item B. Secure to flatcar floor with six 30d nails.
D	4	End cleat. Each consists of two pieces of 2- × 4- × 12-inch lumber. Place against ends of item B. Secure lower piece to car floor with four 30d nails and top piece to lower piece with four 30d nails.
E	2	Frame. Each consists of two pieces of 2- × 4- × 13-foot 6-inch lumber. Place on flatcar floor against inside edge of each track. Secure lower piece to floor with twelve 30d nails and top piece to lower piece with twelve 30d nails (detail 1, fig 7–4).
F	3	Frames. Each consists of two pieces of 2- × 4-inch lumber long enough to fill space between items E (about 86 inches). Place one near center and one at each end between item E. Secure lower piece to flatcar floor with four 30d nails and top piece to lower piece with four 30d nails (detail 1, fig 7–1).
G	4	Wire ropes, 5/8-inch in complete loop. Apply from lifting eyes on front and rear of the vehicle to stake pockets on opposite side of car. If wire ropes contact each other where they cross, suitable cushioning material must be applied to prevent chafing or wear of these items. Thimbles must be placed at the bottom of each stake pocket and fastened to wire rope with one cable clip. Wire rope should be overlapped at least 24 inches.
H	20	Clamps, 5/8-inch. Fasten each wire rope tiedown with four each spaced about 3½ to 4 inches apart.
I	4	Thimbles. Place one thimble at each item H and one thimble under each stake pocket.

SECTION III. TRANSPORT ON FOREIGN RAILWAYS

7–6. General

The transportability guidance contained in this section is applicable when the M992 FAASV is transported on foreign railways. Consideration is given to single and multiple vehicle movements for the types of flatcars normally used in the movement of this type of vehicle. When loaded on a suitable flatcar, the vehicle can be transported, with restrictions, within European countries complying with the Passe-Partout International (PPI) gauge railways; this also applies to the majority of the countries in the Middle East, South America, Australia, India, and Pakistan. In the Middle East and South America, the clearances vary by country, and each country will require a separate check. In Australia, India, and Pakistan, wide- or broad-gauge railways provide greater clearances and fewer restrictions. Because of the various designation systems and clearances used by different countries, evaluation of transport capability must be made on an individual basis.

7–7. Transport on Foreign Service Flatcars

General Instructions

1. Hand brakes must not be set.
2. Tie down is to be done prior to blocking with item B (detail 2, fig 7–4).
3. Loading rules 3, 4, 5, 7, 9, 11, 14, and 15 appearing in section I of the Rules Governing the Loading of Commodities on Open-Top Cars and Trailers, published by the Association of American Railroads, provide applicable guidelines and are mandatory in application.
4. Transport of the M992 FAASV on a 50-inch high flatcar through countries requiring compliance with the PPI gauge will require that standard 2- × 12-inch lumber be placed under the first, second, and third road wheels of both sides of the vehicle.

a. General. The M992 FAASV can be transported on some foreign-service flatcars. Flatcars representative of those available in Europe that are suitable for transporting the vehicle are described in table 7–3.

b. Materials. The materials required for blocking and tiedown of the vehicle on foreign service flatcars are essentially the same as those used for transporting the vehicle within CONUS. Detailed guidance is contained in 4th Transportation Command Pamphlet 55–2, *Tiedown Guide for Rail Movements.*

Table 7–3. Characteristics of European Flatcar Available for Transportation Vehicles.

Flatcar Designation	Capacity	Length	Width	Platform Height
RLMMP 700	57.3-ton (52.00 MT)	31-ft 2-in. (9.50 m)	10-ft 4-in. (3.15 m)	4-ft 2-3/4-in. (1.29 m)
SAMMS 710	71.63-ton (65.00 MT)	49-ft 3 in. (15.01 m)	10-ft 2 in. (3.10 m)	4-ft 2-3/4 in. (1.29 m)

APPENDIX A
CONVERSION TABLES

1. Common Metric Abbreviations

m = meter	kg = kilogram
dm = decimeter	km = kilometer
cm = centimeter	MT = metric ton
mm = millimeter	

2. Linear Measure.

1 mi = 1.609.35 m	1 km = 0.6214 mi
1 yd = 0.9144 m	1 m = 1.0936 yd
1 ft = 0.3048 m	1 m = 3.2808 ft
1 in. = 0.0254 m	1 m = 39.3700 in.

1 m = 10 dm = 100 cm = 1000 mm

3. Surface Measure.

1 sq yd = 0.8361 sq m	1 sq m = 1.196 sq yd
1 sq ft = 0.0929 sq m	1 sq m = 10.764 sq ft
1 sq in. = 0.00065 sq m	1 sq m = 1,550 sq in.

4. Cubic Measure.

1 cu yd = 0.76455 cu m	1 cu m = 1.31 cu yd
1 cu ft = 0.02831 cu m	1 cu m = 35.30 cu ft
1 cu in. = 0.000016 cu m	1 cu m = 61,023 cu in.

5. Weight.

1 STON = 907.185 kg	1 MT = 1,000 kg
1 lb = 0.45359 kg	1 MT = 2,204.62 lb
1 kg = 2.2046 lb	

6. The following simplified coversion factors are accurate to within 2 percent for quick computations:

a. Inches to centimeters—Multiply in. by 10 and divide by 4.

b. Yards to meters—Multiply yd by 9 and divide by 10.

c. Miles to kilometers—Multiply mi by 8 and divide by 5.

d. Pounds to kilograms—Multiply lb by 5 and divide by 11.

Paragraph 7-37, FM 55-15 and paragraph 2-15, TM 55-450-15 contain additional detailed conversion factors.

7. The following conversions are provided for guidance when procuring lumber, wire rope, or wire in areas that use the metric system. Lumber sizes are rounded off to nearest ½ cm.

a. Lumber.

2-in. × 4-in. × desired length = 5 cm × 10-cm × desired length

1-in. × 6-in. × desired length = 2.5-cm × 15-cm × desired length

6-in. × 8-in. × desired length = 15-cm × 20-cm × desired length

1-in. × 12-in. × desired length = 2.5-cm × 30-cm × desired length (length normally expressed in ft or m.)

b. Wire rope.

⅜-in. dia = 9.5-mm dia
½-in. dia = 12.7-mm dia
⅝-in. dia = 15.8-mm dia
¾-in. dia = 19.0-mm dia
⅞-in. dia = 22.2-mm dia
1-in. dia = 25.4-mm dia
1¼-in. dia = 31.7-mm dia
1½-in. dia = 38.1-mm dia

Round off to next higher whole mm of available wire rope sizes.

c. Wire. No. 8 gauge annealed (11/64-in. dia) = 4-37-mm dia. Round off as in *b* above.

APPENDIX B
REFERENCES

A–1. Army Regulations (AR)

AR 55–29	Military Convoy Operations in CONUS
55–80	Highways for National Defense
55–162	Permits for Oversize, Overweight, or Other Special Military Movements on Public Highways in the United States
55–228	Transportation by Water of Explosives and Hazardous Cargo
55–355	Military Traffic Management Regulation
70–44	DOD Engineering for Transportability
70–47	Engineering for Transportability
385–40	Accident Report and Records
746–1	Packaging of Army Materiel for Shipment and Storage

A–2. Field Manuals (FM)

FM 55–9	Unit Air Movement Plan
55–15	Transportation Reference Data
55–17	Terminal Operations Coordinator's Handbook

A–3. Supply Bulletins (SB)

700–20	Army Adopted/Other Items Selected for Authorization/List of Reportable Items

A–4. Technical Bulletins (TB)

55–46–1	Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military Vehicles and Other Outsize/ Overweight Equipment

A–5. Technical Manual (TM)

9–2350–255–10–1	Operators Manual; Tank, Combat, Full-Tracked: 105-mm Gun, M1
38–250 (AFR 71–4)	Packaging and Materials Handling: Preparation of Hazardous Materials for Military Air Shipment
55–405–9	Army Aviation Maintenance Engineering Manual: Weight and Balance
55–500	Marine Equipment Characteristics and Data
55–2200–001–12	Transportability Guidance for Application of Blocking, Bracing and Tiedown Materials for Rail Transport

A–6. Technical Orders (TO)

1–1B–40	Handbook of Weight and Balance Data
1C–5A–9	Loading Instructions, USAF Series C-5A Airplane

A–7. Other Publications and Source of Procurement

a. Code of Federal Regulations, Title 49—Transportation, Parts 170–179
Available from: Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

b. Association of American Railroads Rules Governing the Loading of Commodities on Open-Ton Cars and Trailers
Section No. 1—General Rules
Section No. 6—Rules Governing the Loading of Department of Defense Material on Open-Top Cars
Available from: Association of American Railroads
59 E. Van Buren Street
Chicago, IL 60605

c. American Association of State Highway and Transportation Officials (AASHTO) Legal Maximum Dimensions and Weight of Motor Vehicles Compared with AASHTO Standards
Available from: American Association of State Highway and
Transportation Officials
341 National Press Building
Washington, DC 20004

A–8. Department of Transportation
Special Permit No. 3498
USCG 108 Rules and Regulations for Military Explosives and Hazardous Munitions

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

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The Adjutant General

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